



Seismic interpretation and Structural analysis of a pull-apart basin: El Hamma grabens system (Gabes area, South of Tunisia)

Mouna Houssin (1), Chedly Abbes (2), and wajih bouzid (3)

(1) PhD Student at Faculty of Sciences of Sfax, Tunisia (mounahoussin@yahoo.fr), (2) Professor at Faculty of Sciences of Sfax, Tunisia (chedlyabbes8@gmail.com), (3) PhD Student at Faculty of Sciences of Sfax, Tunisia (bzwajih@gmail.com)

The graben system of El Hamma, west of Gabes in Tunisia, represents an extensive relay ramp between two Principal Shear Zones (PSZ) with dextral N 120 sliding. These PSZ corresponds to two segments of the south-Atlantic shear corridor, which extends from Chott Hodna in Algeria, in the NW, to the Libyan Djeferra in SE. This extensive zone considered as a pull-apart basin, containing two grabens 40 Km long and 15 Km wide, each separated by a horst structure 4 Km large.

Stratigraphic and structural analysis of the field outcrops, correlated with the tectonic events reconstitutions and paleostress showed two main phases in the structuring of this basin:

- In Upper Turonian, under a regional N80 extensive stress, the PSZ were re-mobilized in dextral transtensional displacement inducing the opening of the graben system by extension of the relay zone.
- The NW-SE shortening, installed since Tortonian, re-mobilize the PSZ in dextral transpressive displacement, further reactivating the opening of the basin.

In this work, we present a description of the style and the structural architecture of this graben system based on the interpretation of transverse seismic sections and both seismic and field map data.

To the junction of the stepover with the north PSZ in the vertical plane, the structure corresponds to an asymmetrical unique graben with a maximal subsidence in its eastern boundary. In this side, it is bounded by a major listric fault with a sub-vertical dip at the surface and lowered in dip angle to approximately 50° at its base. On the other hand, its Western edge is characterized by a beam of antithetic normal faults of lower dip, inclined towards the major fault.

At its northern margin, the structural system contains two grabens separated by a horst. The first, which is the main graben, is an extension of the graben described at the junction stepover with north PSZ, and shows the same geometry. The second, developed in the east, is rather symmetrical and bounded by two opposite listric faults, having a sub-vertical dip at the surface and decreasing to approximately 60° in depth. Symmetrically, at its southern side, the overall structure is similar to the northern side but with a reversion of the asymmetric direction of the principal graben.

In the basin center, the main graben appears to be symmetrical and less subsident compared to its basin margins. In addition, it is divided by a set of faults of opposite dip delimiting a second order system of horst and grabens. In all the sections, the faults are rooted at the roof of a Triassic salt intrusion at the base of the grabens but this fact is not considered in this work for now.

Based on map data, the faults structuring the whole basin are organized in two main sets. The first includes faults of an average N160 direction, corresponding to the graben edges along which they are disposed in dextral echelon. The others, in the N130-140 direction are developed inside the main graben where they are laterally connected to the N160 fault. Both sets delimit therefore two rhomboidic subsident basins in the margin of this main graben, separated by a central high geometrically similar.